

## N-Channel 20 V (D-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.125 at $V_{GS} = 4.5$ V	2.4
	0.200 at $V_{GS} = 2.5$ V	1.8

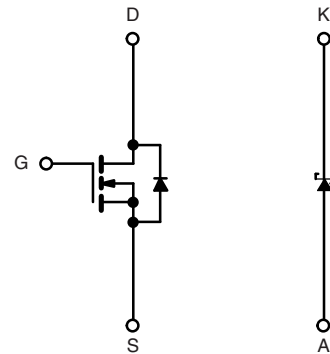
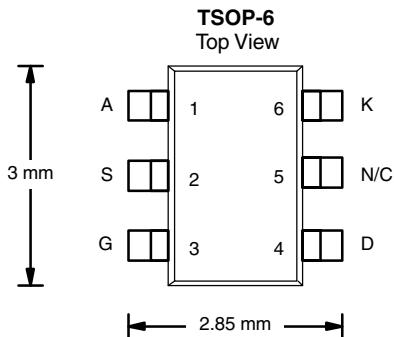
SCHOTTKY PRODUCT SUMMARY		
$V_{KA}$ (V)	$V_F$ (V) Diode Forward Voltage	$I_F$ (A)
20	0.48 V at 0.5 A	0.5

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT® Plus
- 100 %  $R_g$  Tested
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**



**Ordering Information:** Si3812DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)					
Parameter	Symbol	5 s	Steady State	Unit	
Drain-Source Voltage (MOSFET)	$V_{DS}$	20		V	
Reverse Voltage (Schottky)	$V_{KA}$	20		V	
Gate-Source Voltage (MOSFET)	$V_{GS}$	$\pm 12$		V	
Continuous Drain Current ( $T_J = 150$ °C) (MOSFET) <sup>a</sup>	$I_D$	$T_A = 25$ °C	2.4	2.0	A
		$T_A = 85$ °C	1.7	1.4	
Pulsed Drain Current (MOSFET)	$I_{DM}$	8		A	
Continuous Source Current (MOSFET Diode Conduction) <sup>a</sup>	$I_S$	1.05	0.75		
Average Forward Current (Schottky)	$I_F$	0.5	0.5		
Pulsed Forward Current (Schottky)	$I_{FM}$	8	8		
Maximum Power Dissipation (MOSFET) <sup>a</sup>	$P_D$	$T_A = 25$ °C	1.15	0.83	W
		$T_A = 85$ °C	0.59	0.53	
Maximum Power Dissipation (Schottky) <sup>a</sup>	$P_D$	$T_A = 25$ °C	1.0	0.76	
		$T_A = 85$ °C	0.52	0.48	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C	

**Note:**

a. Surface mounted on 1" x 1" FR4 board.

THERMAL RESISTANCE RATINGS						
Parameter		Device	Symbol	Typical	Maximum	Unit
Junction-to-Ambient <sup>a</sup>	$t \leq 5$ s	MOSFET	$R_{thJA}$	93	110	°C/W
		Schottky		103	125	
	Steady State	MOSFET		130	150	
		Schottky		140	165	
Junction to Foot (MOSFET Drain, Schottky Cathode)	Steady State	MOSFET	$R_{thJF}$	75	90	
		Schottky		80	95	

**Note:**

a. Surface mounted on 1" x 1" FR4 board.

MOSFET AND SCHOTTKY SPECIFICATIONS ( $T_J = 25$ °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250$ $\mu$ A	0.6			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			$\pm 100$	nA
Zero Gate Voltage Drain Current (MOSFET and Schottky)	$I_{DSS}$	$V_{DS} = 16$ V, $V_{GS} = 0$ V			1	$\mu$ A
		$V_{DS} = 16$ V, $V_{GS} = 0$ V, $T_J = 85$ °C			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 4.5$ V	5			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5$ V, $I_D = 2.4$ A		0.100	0.125	$\Omega$
		$V_{GS} = 2.5$ V, $I_D = 1.0$ A		0.160	0.200	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 5$ V, $I_D = 2.4$ A		5		S
Schottky Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 1.5$ A, $V_{GS} = 0$ V		0.79	1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10$ V, $V_{GS} = 4.5$ V, $I_D = 2.4$ A		2.1	4.0	nC
Gate-Source Charge	$Q_{gs}$			0.3		
Gate-Drain Charge	$Q_{gd}$			0.4		
Gate Resistance	$R_g$		1		3.7	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10$ V, $R_L = 10$ $\Omega$ $I_D = 1$ A, $V_{GEN} = 4.5$ V, $R_g = 6$ $\Omega$		10	17	ns
Rise Time	$t_r$			30	50	
Turn-Off Delay Time	$t_{d(off)}$			14	25	
Fall Time	$t_f$			6	12	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 3.0$ A, $di/dt = 100$ A/ $\mu$ s		30	50	

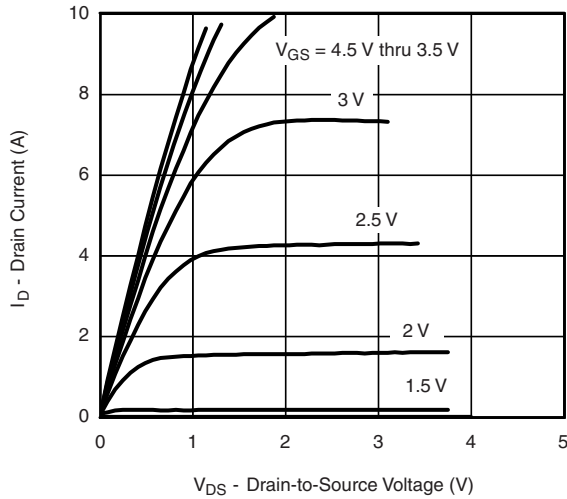
**Notes:**

- a. Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.  
 b. Guaranteed by design, not subject to production testing.

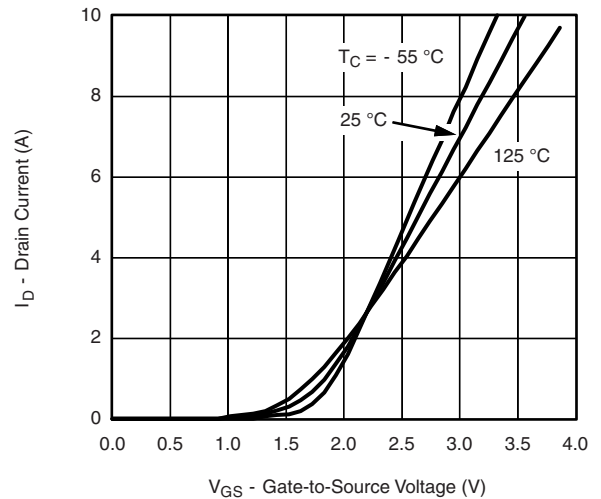
SCHOTTKY SPECIFICATIONS ( $T_J = 25$ °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	$V_F$	$I_F = 0.5$ A		0.42	0.48	V
		$I_F = 0.5$ A, $T_J = 125$ °C		0.33	0.4	
Maximum Reverse Leakage Current	$I_{rm}$	$V_R = 20$		0.002	0.100	mA
		$V_R = 20$ V, $T_J = 75$ °C		0.06	1	
		$V_R = 20$ V, $T_J = 125$ °C		1.5	10	
Junction Capacitance	$C_T$	$V_R = 10$ V		31		pF

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

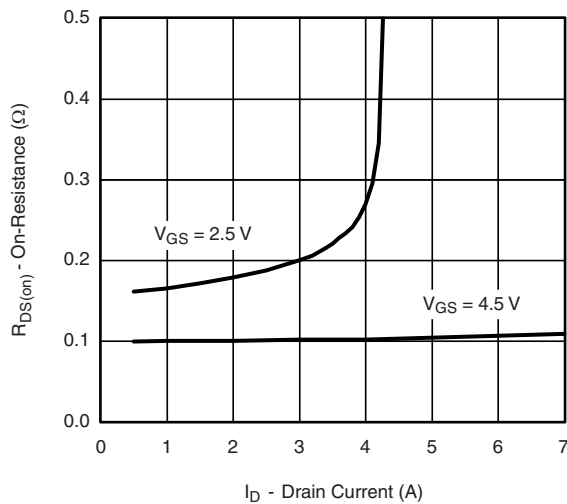
## MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



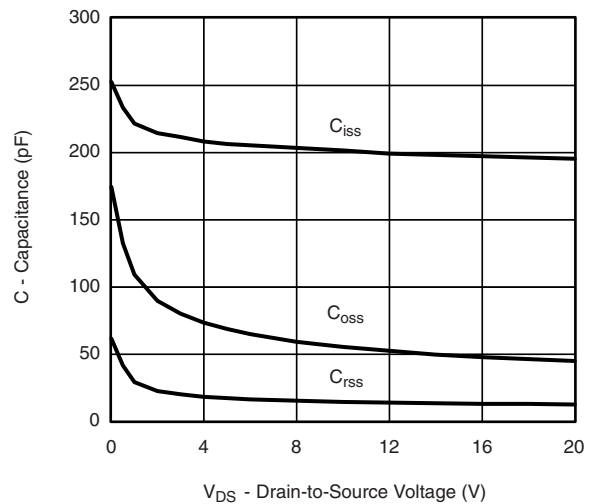
**Output Characteristics**



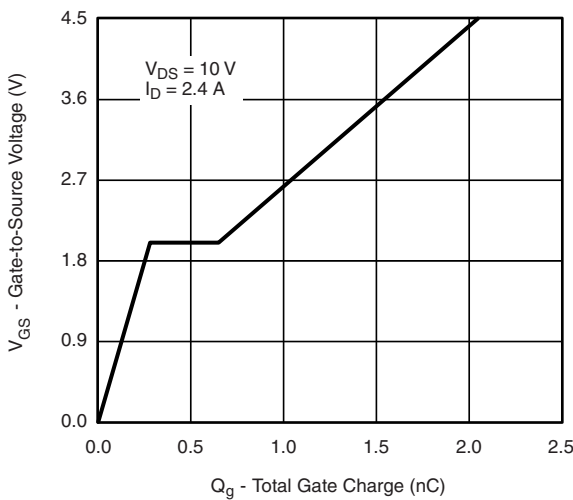
**Transfer Characteristics**



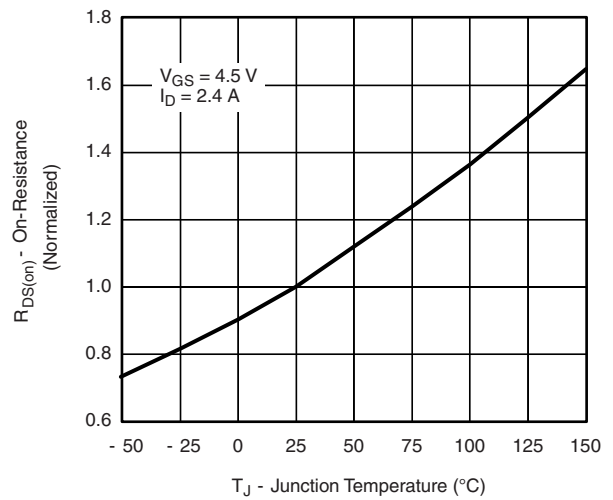
**On-Resistance vs. Drain Current**



**Capacitance**

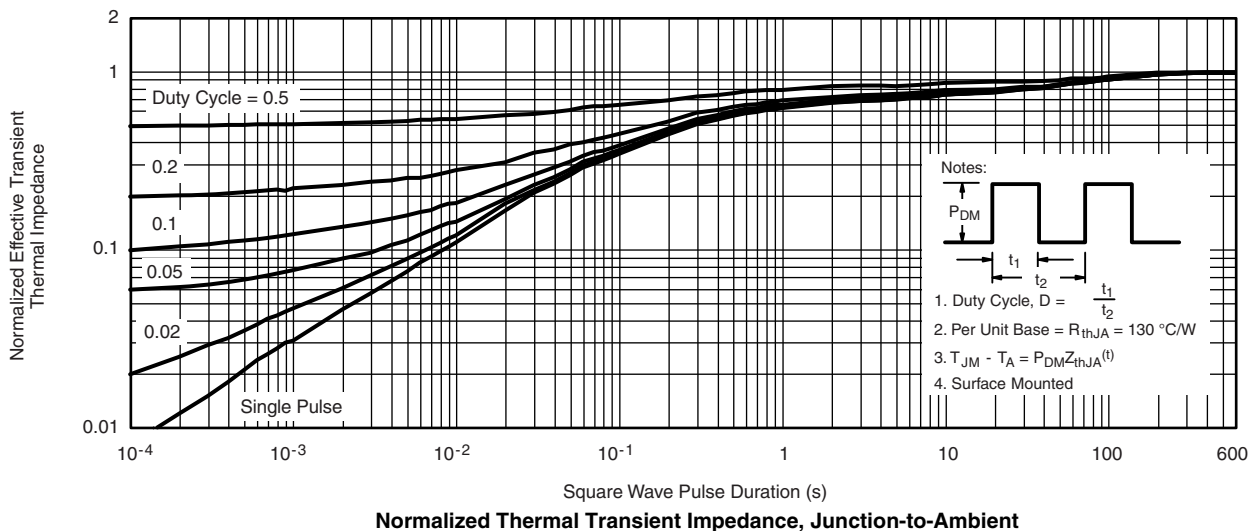
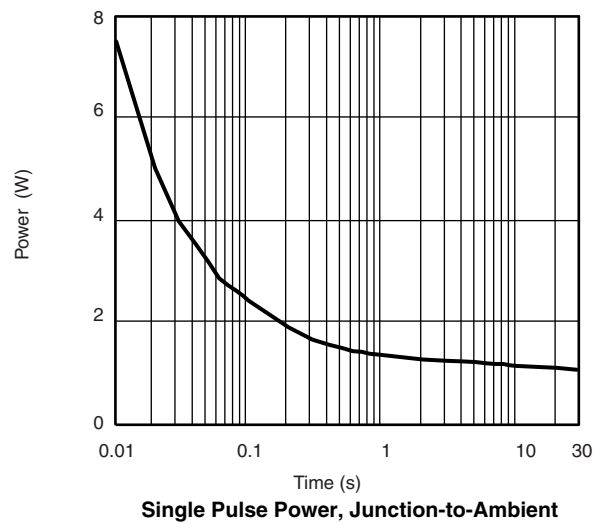
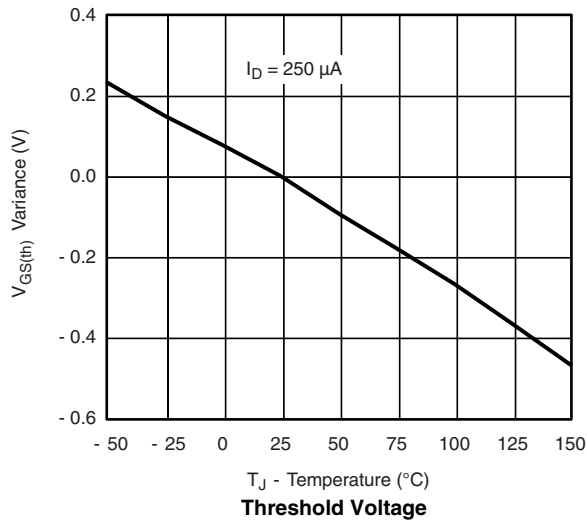
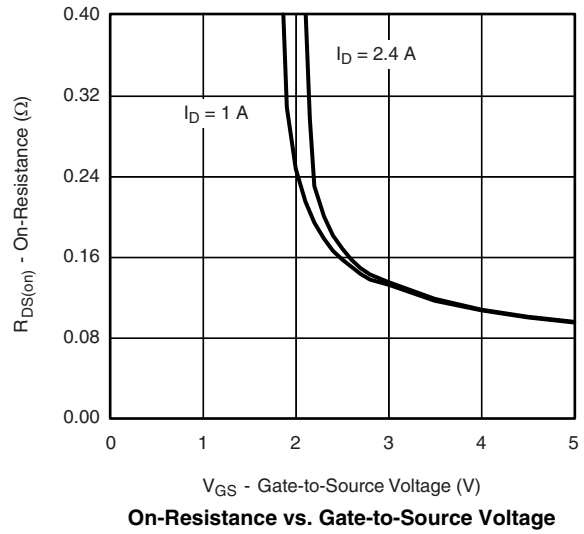
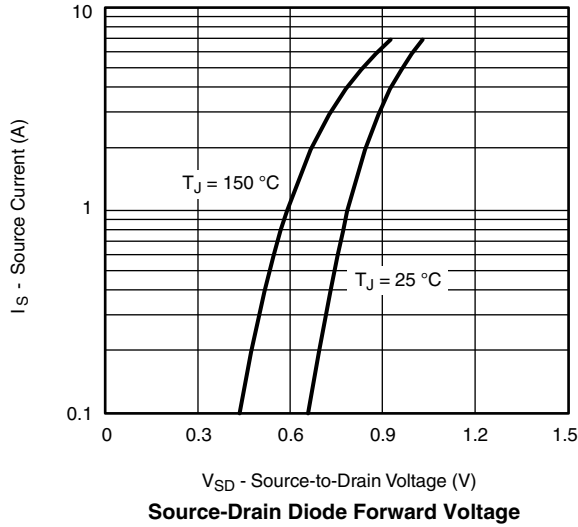


**Gate Charge**

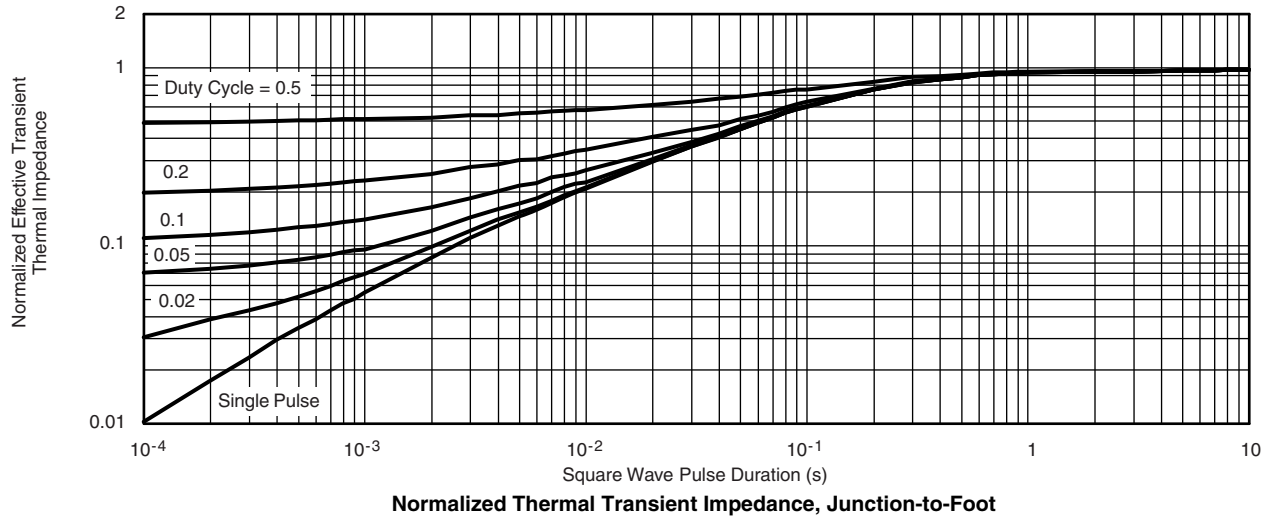


**On-Resistance vs. Junction Temperature**

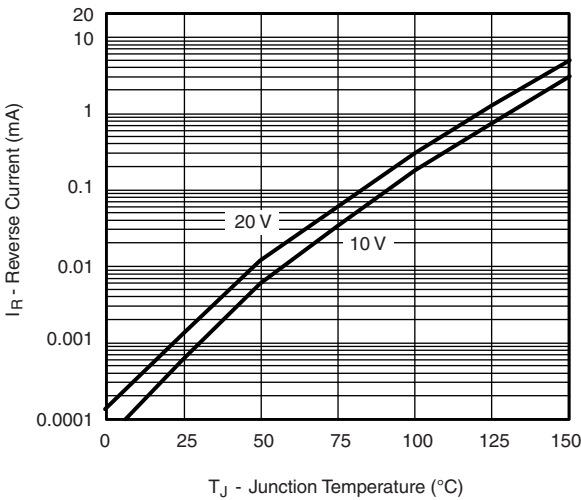
**MOSFET TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



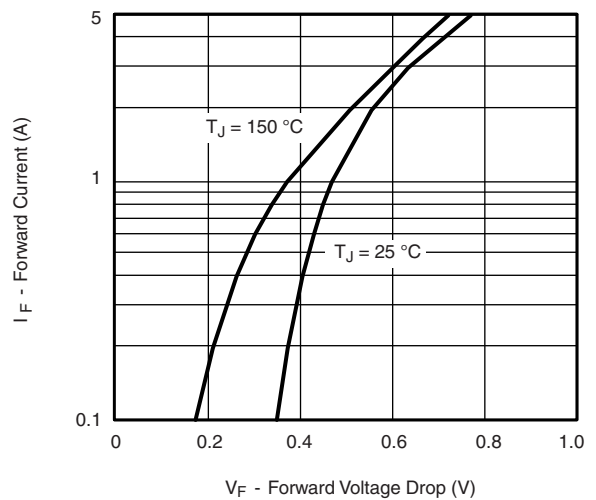
**MOSFET TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



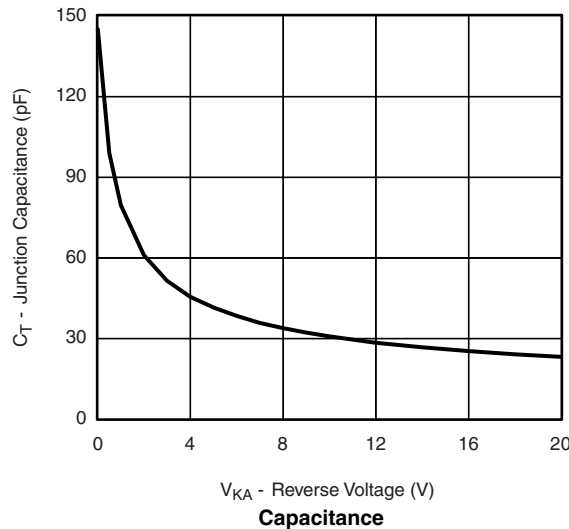
**SCHOTTKY TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



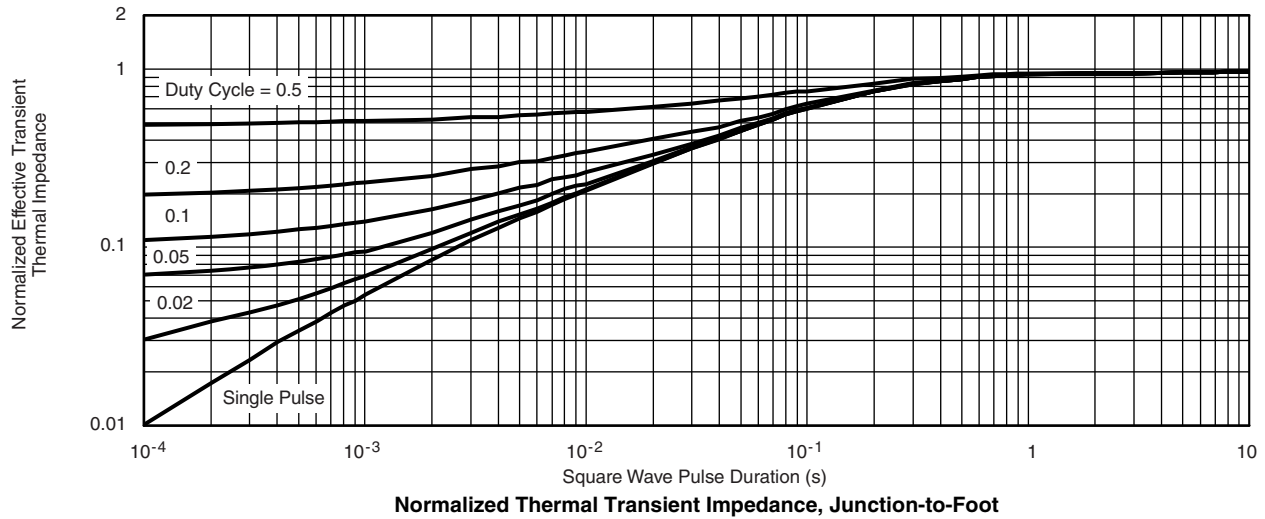
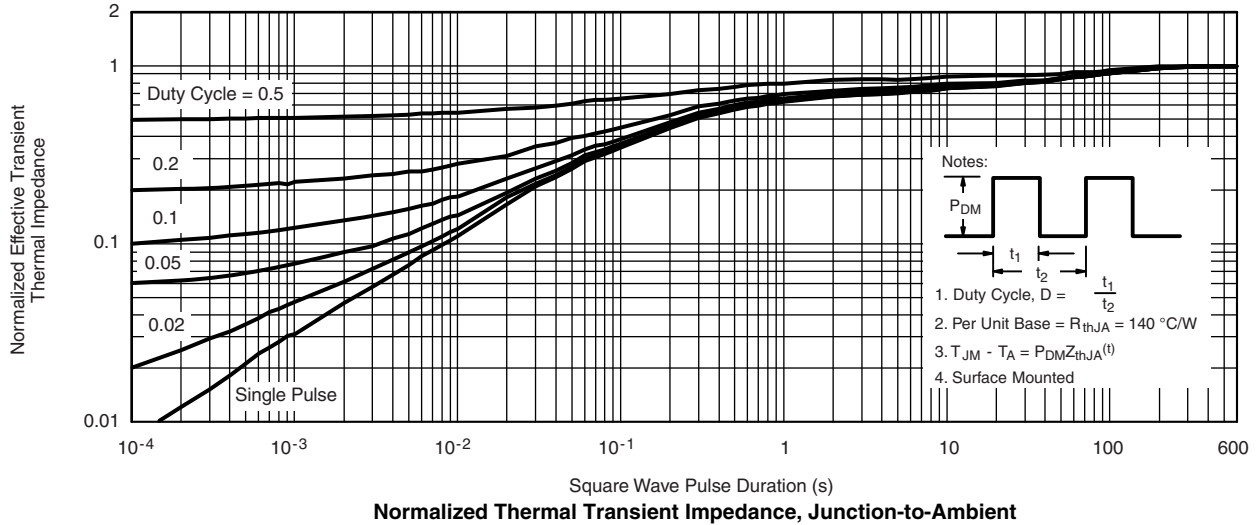
**Reverse Current vs. Junction Temperature**



**Forward Voltage Drop**



**SCHOTTKY TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



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